IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of	
Jonas NILSSON et al.	Confirmation No: 1463
Application No.: 10/584,246	Group Art Unit: 1793
Filed: July 20, 2007	Examiner: Deborah Yee
For: STEEL ALLOY FOR CUTTING DETAILS	Appeal No.:

APPEAL BRIEF

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Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Appellant appeals the final rejection by the Primary Examiner, mailed March 9, 2009, under 35 U.S.C. § 134(a). A Notice of Appeal and $540 fee pursuant to 37 C.F.R. § 41.20(b)(1) were timely filed on September 9, 2009. The present Appeal Brief and $540 fee pursuant to 37 C.F.R. § 41.20(b)(2) thus are timely filed by April 9, 2010, because of the concurrently filed petition for a FIVE-month extension of time. If additional fees are due, please charge deposit account 50-0573.

Table of Contents

I. Real Party in Interest

Sandvik Intellectual Property Aktiebolag is the real party in interest, and is the assignee of Application No. 10/584,246.

II. Related Appeals and Interferences

The Appellants' legal representative, or assignee, does not know of any other appeal or interferences which will affect or be directly affected by or have bearing on the Board's decision in the pending appeal.

III. Status of Claims

Claims 2-23 are rejected by the Examiner. All of the rejected claims are appealed in this application.

Claim 17 is the independent claim. Claims 2-16 and 18-23 depend from claim 17. These claims have been twice rejected by the Examiner.

Claims 2-23 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Japan 2001-049399 to Hitachi Metals Ltd (hereafter "JP '399") alone or in view of U.S. Patent No. 5,714,114 to Uehara (hereafter "*Uehara*").

Claim 1 is canceled.

IV. Status of Amendments

All amendments in this application have been entered, including the amendment dated May 29, 2009 that was entered for appeal purposes by the Examiner in the Advisory Action dated June 8, 2009.

V. Summary Claimed Subject Matter

Exemplary embodiments disclosed in the present application are directed to steel alloys for cutting details. The steel alloys, among other particular properties, are to have high corrosion resistance and hardness (*see, e.g.*, p. 1, ll. 3-8). In particular, the corrosion resistance of concern is pitting corrosion (*see, e.g.*, p. 2, ll.

29-31). In order to be able to meet the particular properties and simultaneously produce a finished material in strip form in a cost-effective way, a particular optimization is required of the alloying elements (*see, e.g.*, p. 4, ll. 12-15).

Accordingly, the disclosed steel alloy broadly contains (in weight %) 0.4-0.6% C, 0.1-1.0% Si, 0.3-1.0% Mn, 12-15% Cr, 2.5-4.0% Mo, 0-1.0% Ni, 0-4.0% Co, 0.15-0.20% N, <0.1% Cu, balance Fe and inevitable impurities. The alloy has a hardness of greater than 56 HRC and a PRE (pitting resistance equivalence) number[1] of greater than 25 (*see, e.g.*, p. 5, ll. 24-26 and p. 8, ll. 15-31). The PRE value is a good indicator of corrosion resistance at least because it includes weight percentages of chromium, molybdenum, and nitrogen, which have been determined to be the most important alloying elements to control pitting corrosion (*see, e.g.*, p. 2, l. 29 – p. 3, l. 6).

The above general characteristics are embodied in the present independent claim 17. Claim 17 recites:

17. A steel alloy, comprising:		p. 8, l. 17
a composition including (in % by weight):		p. 8, l. 18
C	0.40-0.60%	p. 8, l. 19
Si	0.1-1.0%	p. 8, l. 20
Mn	0.3-1.0%	p. 8, l. 21
Cr	12-15%	p. 8, l. 22
Mo	2.5-4.0%	p. 8, l. 23
Ni	0-1.0%	p. 8, l. 24
Co	0-4.0%	p. 8, l. 25
N	0.15-0.20%	p. 8, l. 26
Cu	<0.1%	p. 5, ll. 25-26
and the balance Fe as well as normally occurring impurities;		p. 8, ll. 29-31
a hardness > 56 HRC; and		p.8, l. 27
a value for PRE > 25, wherein PRE = % Cr + 3.3 • % Mo + 16 • % N.		p. 8, ll. 28-29

[1] A PRE (Pitting Resistance Equivalence) number is a quantitative representation that is used in the art to predict corrosion properties based on the composition of the alloy and to compare such properties between alloys of different compositions. A related quantitative representation is the PREW number, which is similar to the PRE number but includes in the calculation the amount of tungsten (W) in the alloy.

As shown in the above table, the application discloses the individual features of the above independent claims at, for example, page 5, lines 25-26 and page 8, lines 17-31.

Relevant to this appeal, independent claim 17 recites that the composition of the steel alloy includes, among other things, <0.1 wt-% copper.

The dependent claims contain features related to additional aspects and properties of the claimed article.

VI. Grounds of Rejection to be Reviewed on Appeal

Whether claims 2-23 are obvious in view of the disclosure in JP '399 alone or in view of the disclosure in *Uehara*.

VII. Argument

Claims 2-23 stand rejected under 35 U.S.C. §103(a) as being unpatentable over JP '399 alone or in view of *Uehara*. This rejection is respectfully traversed because the Examiner's *prima facie* case has been rebutted by, among other things, reference to the technical teachings and teaching away contained in JP '399 and *Uehara* as well as related arguments refuting the proposed combination and/or modification of references. Furthermore, the obviousness rejection itself is deficient because, among other things, it is not accompanied by a reasoned statement explaining the basis for any modification of the cited references and relies upon improper optimization.

A. Summary of the cited art

JP '399: JP '399 discloses a stainless steel excellent in pitting corrosion resistance by providing a stainless steel with a composition consisting of specific percentages of C, Si, Mn, Cr, Mo, W, N, Ni, and Cu and balance Fe (*See, e.g.*, English abstract). This stainless steel has the following composition (*See, e.g.*, English abstract):

Element	Amount (wt.-%)
C	0.40-0.60
Si	≤2.0
Mn	≤2.0
Cr	11-18
Mo[2]	1.0-3.0
Ni	0.1-2.5
Co[3]	≤5.0
N	0.15-0.20
Cu	0.1-3.0
Fe	remainder
inescapable impurities	

JP '399 discusses the basis for and limitations on the range of each of the constituent elements in paragraphs [0012] to [0021]. In this regard and relevant to this appeal, JP '399 states that copper content is limited to a particular weight percentage range of from 0.1 to 3.0%, at least because Cu is important to pitting corrosion resistance for steel containing Cr, Mo, and N. Less than 0.1% of Cu does not sufficiently affect the pitting corrosion resistance, whereas Cu added exceeding 3.0% deteriorates the hot workability. Therefore, Cu is required in JP '399 to be added in a concentration from 0.1% to 3.0% (*see, e.g.*, para. [0016]).

JP '399 does not expressly disclose a PRE or PREW value. Further, although JP '399 discloses that chromium, molybdenum, and nitrogen as well as copper all have a positive effect on pitting corrosion resistance, JP '399 fails to recognize the importance of a particular combination of concentrations of chromium, molybdenum, and nitrogen to achieve improved pitting corrosion resistance.

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[2] The percentage of Mo is described alone or within the same weight percentage range for the combination of Mo + ½ W.

[3] Paragraph [0011] of the English machine translation appears to state that the invention may include ≤5% Co.

Uehara: *Uehara* discloses a stainless steel (see Abstract). The composition of the stainless steel is disclosed in col. 3, ll. 8-17 and 54-60 of the original document and is summarized below in table form:

Element	Amount %	Preferred Amount %
C	0.15-0.40	0.20-0.35
Si	≤2.0	≤2.0
Mn	≤2.0	≤2.0
Cr	11-15	11-15
Mo[4]	1.0-3.0	1.0-3.0
Ni	0.1-1.5	0.3-0.75
Co[5]	≤5.0	≤5.0
N	0.02-0.15	0.02-0.15
Cu	0.1-2.0	0.1-1.0
Fe	Balance	Balance
inescapable impurities		

Uehara discusses the basis for and limitations on the range of each of the constituent elements in column 5, line 40 through column 8, line 6.

Uehara does not disclose any PRE or PREW values. Further, although *Uehara* discloses that chromium, molybdenum, and nitrogen as well as copper all have a positive effect on pitting corrosion resistance, *Uehara* fails to recognize the importance of a particular combination of concentrations of chromium, molybdenum, and nitrogen to achieve improved pitting corrosion resistance.

B. One of Ordinary Skill in the Art.

Throughout this brief, one of ordinary skill in the art is considered to be an individual with a bachelor's degree in materials science or metallurgy or the equivalent experience.

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[4] The percentage of Mo is described alone or within the same weight percentage range for the combination of Mo + ½ W.

C. Discussion of the rejections

Claims 2-23 stand rejected under 35 U.S.C. §103(a) as being unpatentable over JP '399 alone or in view of *Uehara*. This rejection is respectfully traversed.

To establish a *prima facie* case of obviousness, each and every element of the claims must be obvious over the cited prior art. JP '399 and *Uehara* both fail to disclose or render obvious at least the following elements of independent claim 17:

1) A steel alloy having less than 0.1 wt% Cu; and

2) A PRE value greater than 25.

1. JP '399 and *Uehara* each fail to disclose less than 0.1 wt% Cu.

Independent claim 17 recites that the composition of the steel alloy includes, among other things, less than 0.1 wt-% copper. In rejecting these claims, the Examiner admits that JP '399 discloses copper only in the range of 0.1-3.0 wt-% (*see, e.g.*, Official Action dated March 9, 2009 at page 2). Where claimed ranges "overlap or lie inside ranges disclosed by the prior art" a *prima facie* case of obviousness exists. *In re Wertheim*, 541 F.2d 257, 191 U.S.P.Q. 90 (C.C.P.A. 1976). However, as admitted by the Examiner, there is no overlap of copper concentration between the claimed invention and either JP '399 or *Uehara*. Thus, a further explicit reason must be provided to establish a *prima facie* case of obviousness.

The Examiner alleges that the claimed range would have been obvious, because the lower limit of 0.1% Cu "closely approximates" Appellant's upper limit of <0.1% Cu. This allegation is apparently based on Federal Circuit decisions such as *Titanium Metals Corp. of America v. Banner*, 778 F.2d 775, 227 U.S.P.Q. 773 (Fed. Cir. 1985). For a reference to render obvious concentrations outside the disclosed ranges based on this rationale, the Examiner must show that it would have been expected that the concentrations would have the same properties. For example, in *Titanium Metals*, examples were found bracketing the claimed concentration, and the examples with concentrations on either side of the claimed concentration had similar

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[5] Paragraph [0011] of the English machine translation appears to state that the invention may include ≤5% Co.

properties. In contrast, the only example in JP '399, Example 21, that has a copper concentration that is not greater than 0.1% has a substantial reduction in pitting potential (*see, e.g.*, Table 1 and Table 2 showing a pitting potential (Vc 100) of only 12 compared to all of the inventive examples 1-13 having a value near or greater than 100).

Rather than provide evidence that the properties would have been expected to be the same, the Examiner improperly puts the burden on Appellant to prove that the concentrations would not have the same properties. Specifically, the Examiner alleges that because no comparative test data has been provided to show that <0.1% Cu is critical and productive of new and unexpected results, the claims are not patentably distinguished over the prior art (*see, e.g.*, Official Action dated March 9, 2009 at page 2). Such a rebuttal requirement is required only where a *prima facie* case of obviousness has already been established, typically by a showing of overlapping ranges.

Further, even if it is found that a *prima facie* case of obviousness has been established, Appellants have further provided rebuttal evidence. In addition to a showing of unexpected results, a *prima facie* case of obviousness of ranges may be rebutted by showing that the art, in any material respect, teaches away from the claimed invention. *In re Geisler*, 116 F.3d 1465, 1471, 43 U.S.P.Q.2d 1362, 1366 (Fed. Cir. 1997). "A reference may be said to teach away when a person of ordinary skill, upon reading the reference, . . . would be led in a direction divergent from the path that was taken by the applicant." *Tec Air, Inc. v. Denso Mfg. Mich. Inc.*, 192 F.3d 1353, 1360, 52 U.S.P.Q.2d 1294, 1298 (Fed. Cir. 1999).

JP '399 and *Uehara* each provide explicit disclosure teaching away from using less than 0.1% Cu in the steel alloy. Specifically, paragraph [0016] of the English machine translation of JP '399 and column 6, lines 44-53 of *Uehara* each state that Cu is a necessary element in a steel alloy containing Cr, Mo, and N for increasing pitting corrosion resistance. Further, both references state that if Cu is less than 0.1%, a sufficient effect on pitting corrosion resistance can not be obtained. Therefore, a person of ordinary skill, upon reading JP '399 and *Uehara*, would be led away from adding Cu in a concentration less than 0.1%, even a value just slightly less than 0.1%. In *Geisler*, the reference was not found to be teaching away, at least

because the reference suggested that concentrations near the lower limit were desired. In contrast, JP '399 provides an upper limit that is substantially larger than the lower limit, and all of the inventive examples have Cu concentrations of at least 0.48%, which is not near the lower limit of 0.1% (*see, e.g.*, Table 1 in the English machine translation).

Further, Appellants unexpectedly discovered that by forming a steel alloy containing a specific combination of Cr, Mo, and N, the alloy possesses an increased pitting corrosion resistance without the need of Cu content above 0.1%, as required in JP '399 and *Uehara* (*see, e.g.*, p. 2, l. 29 – p. 3, l. 6 of the Specification). Further, Appellants discovered that in order to avoid deterioration in the hot working properties of the alloy, the copper content must be kept below 0.1% (*see, e.g.*, p. 5, ll. 21-26). Although JP '399 and *Uehara* recognized that too much Cu in the steel alloy leads to deterioration in the hot working properties of the alloy, they did not recognize that a specific combination of Cr, Mo, and N could eliminate the need to add Cu at a concentration of at least 0.1 wt%.

As a result, and for at least this reason, a person of ordinary skill would not have used less than 0.1 wt% Cu. In this regard, JP '399 and *Uehara* teach away from the proposed modification that is the basis for rejecting this feature of the claim. Thus, no *prima facie* case of obviousness is established. Accordingly, the Board is respectfully requested to reverse the rejection.

2. JP '399 and *Uehara* each fail to disclose a PRE value greater than 25.

Claim 17 recites that the steel alloy has "a value for PRE > 25, wherein PRE = % Cr + 3.3 • % Mo + 16 • % N." JP '399 and *Uehara* are silent on PRE values, as admitted by the Examiner (*see, e.g.*, Advisory Action dated June 8, 2009). However, the Examiner alleges that the prior art discloses compositions meeting the claimed PRE value, and that the discovery of a general formula covering a composition described in the prior art is not patentable. Although Appellants agree that a general formula covering a composition described in the prior art would not render that composition patentable, Appellants do not agree that the prior art describes a composition meeting the claimed PRE value.

Although Appellants admit that the broad ranges of Cr, Mo, and N disclosed in JP '399 and *Uehara* include concentrations that could theoretically meet the PRE value claimed, both references also disclose concentrations that would not meet the PRE value claimed. Also, the alloys in, e.g., Table 1 of *JP-399*, that do have PRE values > 25 also have concentrations of constituent elements outside of the claimed ranges in Claim 17. Specifically, the Examiner has pointed to Example 8 in JP '399 that has a PRE value greater than 25. However, although alloy No. 8 does indeed have a PRE > 25, the composition of that alloy differs in three elements – Mo, Cu and Ti – from that claimed. Also, the Cr-content is very close to the upper limit of 15 wt%. Therefore, to meet the PRE value claimed, one of ordinary skill in the art would have to pick and choose from the ranges for the particular constituent values that would create a PRE value greater than 25 while also meeting the additional compositional limits as claimed.

However, without recognizing the PRE value as a result-effective variable, one of ordinary skill in the art would have no reason to optimize the concentrations to arrive at the claimed PRE value. The obviousness of discovering an optimum value of a variable in a known process is predicated on whether the parameter optimized was a recognized result effective variable. *In re Antonie*, 559 F.2d 618, 620, 195 U.S.P.Q. 6, 8-9 (C.C.P.A. 1977) (explaining the limits of the general optimization rule laid out in *In re Aller*, 220 F.2d 454, 105 U.S.P.Q. 233 (C.C.P.A. 1955). In particular, Applicants discovered that adding chromium, molybdenum, and nitrogen in concentrations where the PRE value is greater than 25 provides improved pitting corrosion resistance. Although JP '399 and *Uehara* disclose that chromium, molybdenum, and nitrogen as well as copper all have a positive effect on pitting corrosion resistance, *Uehara* fails to recognize the importance of a particular combination of concentrations of chromium, molybdenum, and nitrogen to achieve improved pitting corrosion resistance.

Although it is understood that the rationale for modifying a reference can be different from Applicants' rationale, there must still be a rationale for such a modification. As explained above, *Uehara* and *JP-399* fail to recognize the advantage of a PRE value greater than 25, and thus cannot be modified for that purpose. Additionally, the optimized concentrations suggested in *Uehara* and *JP-*

399 result in PRE values less than 25 and/or with concentrations outside the claimed ranges. For example, in *Uehara* the described preferred ranges of Cr of between 13 and 14% (col. 6, l. 27); Mo of between 1.5 and 2.5% (col. 6, l. 43); and N of between 0.05 and 0.15% (col. 7, l. 5), when combined, contain a PRE value less than 25. Therefore, prior to the recognition by Applicant of the advantage of a PRE value greater than 25, there is no evidence to support the conclusion that one of ordinary skill in the art would have optimized the steel alloy to arrive at a PRE value greater than 25 as recited in claim 17. Thus, for at least this reason, no *prima facie* case of obviousness is established. Accordingly, the Board is respectfully requested to reverse the rejection.

3. *The Dependent Claims*

In regard to the dependent claims 2-16 and 18-23, these claims are improperly rejected as obvious and/or distinguish over the combination of JP '399 in view of *Uehara* for at least the same reasons as discussed herein with respect to independent claim 17 from which they depend.

For all the aforementioned reasons, all the pending claims comply with the relevant patent statutes. Appellant thus requests the Board to reverse the rejections of record and remand the application to the Examiner with the instruction to allow the claims.

VIII. Claims Appendix

See attached Claims Appendix for a copy of the claims involved in the appeal.

IX. Evidence Appendix

Not used.

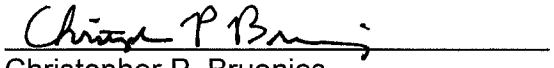
X. Related Proceedings Appendix

Not used.

Respectfully submitted,

Drinker Biddle & Reath, LLP

Dated: April 7, 2010

By: 

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VIII. CLAIMS APPENDIX

The Appealed Claims

Claim 1 (Canceled)

Claim 2 (Rejected): Steel alloy according to claim 17, wherein C = 0.42-0.60 % by weight.

Claim 3 (Rejected): Steel alloy according to claim 17, wherein Si = 0.15-0.80 % by weight.

Claim 4 (Rejected): Steel alloy according to claim 17, wherein Mn = 0.4-0.8 % by weight.

Claim 5 (Rejected): Steel alloy according to claim 17, wherein Cr = 13–15 % by weight.

Claim 6 (Rejected): Steel alloy according to claim 17, wherein Mo = 2.6-4.0 % by weight.

Claim 7 (Rejected): Steel alloy according to claim 17, wherein the steel alloy comprises carbides, nitrides and/or carbonitrides, wherein a maximal diameter of the carbides, nitrides and/or carbonitrides does not exceed 5 µm.

Claim 8 (Rejected): Knife comprising the steel alloy according to claim 17.

Claim 9 (Rejected): Cutting edges for either dry or wet shaving comprising the steel alloy according to claim 17.

Claim 10 (Rejected): Cutting tool for surgical applications comprising the steel alloy according to claim 17.

Claim 11 (Rejected): Doctor blade or creping blade comprising the steel alloy according to claim 17.

Claim 12 (Rejected): Steel alloy according to claim 2, wherein C = 0.42-0.50 % by weight.

Claim 13 (Rejected): Steel alloy according to claim 3, wherein Si = 0.15-0.55 % by weight.

Claim 14 (Rejected): Steel alloy according to claim 4, wherein Mn = 0.4-0.7 % by weight.

Claim 15 (Rejected): Steel alloy according to claim 5, wherein Cr = 14-15 % by weight.

Claim 16 (Rejected): Steel alloy according to claim 6, wherein Mo = 2.6-3.0 % by weight.

Claim 17 (Rejected): A steel alloy, comprising:

a composition including (in % by weight):

C	0.40–0.60
Si	0.1–1.0
Mn	0.3–1.0
Cr	12–15
Mo	2.5–4.0
Ni	0–1.0
Co	0–4.0
N	0.15–0.20
Cu	<0.1

balance Fe as well as normally occurring impurities;

a hardness > 56 HRC; and

a value for PRE > 25, wherein PRE = % Cr + 3.3 • % Mo + 16 • % N.

Claim 18 (Rejected): The steel alloy of claim 17, wherein the hardness is attained by hardening without deep freezing.

Claim 19 (Rejected): The steel alloy of claim 17, wherein Co = about 0.5 % by weight.

Claim 20 (Rejected): The steel alloy of claim 17, wherein Co = 1.0 – 2.0 % by weight.

Claim 21 (Rejected): The steel alloy of claim 17, wherein Co = 0.5 to 2.0 % by weight.

Claim 22 (Rejected): The steel alloy of claim 17, wherein (C + N) in weight % is greater than 0.55 by weight.

Claim 23 (Rejected): The steel alloy of claim 17, wherein a ratio of carbon to nitrogen is greater than two.

IX. EVIDENCE APPENDIX

Not used

X. RELATED PROCEEDINGS APPENDIX

Not used